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Title: Unattended Dual Current Monitor (UDCM) Unattended Multiplicity Shift Register (UMSR) FY19 Summary Report

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Unattended Dual Current Monitor (UDCM)
Unattended Multiplicity Shift Register (UMSR)
FY19 Summary Report

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Summary

In FY19 LANL was funded to complete the user manuals for both the UDCM and the UMSR. LANL was also funded to add auto-ranging functionality to the UDCM. At mid-year, additional funding was obtained to modify the firmware to run an on board server making it compatible with the IAEA RAINSTORM data communications protocol.

Description

Both the UMSR and the UDCM user manuals are complete and are ready to be delivered with the set of UDCM and UMSR prototypes.

Adding auto-ranging capability to the UDCM was the largest task for this FY. Thorough review of the auto-ranging technique implemented in the old mini-GRAND was completed prior to implementing it in the UDCM. The technique used in the UDCM matches the existing method implemented in the mini-GRAND. The UDCM has three gain ranges, low, medium and high gains, and a maximum and minimum current level is hard coded into the instrument for each of these ranges. The instrument will automatically change gains if the input current is outside of the minimum or maximum for the selected range three times in a row. This functionality was added to the UDCM firmware and tested in the lab.

At mid-year we received feedback from the IAEA on the UMSR. The feedback made it clear that there was a misunderstanding about RAINSTORM compliance of the instruments. The UDCM and UMSR were originally planned to run RAINSTORM software on the internal CPU. During our meetings with the IAEA, specifically the one in September of 2018, we understood that the instruments only needed RAINSTORM compliant files and file structures because the IAEA was going to design a RAINSTORM box that would be included with each rack. The mid-year feedback made it clear that the IAEA needs a webserver on the instruments to provide the RAINSTORM compliant files to the RAINSTORM box. So for this additional task LANL added the Apache webserver to the internal processor. This webserver runs continuously on the UDCM and the UMSR and provides the necessary files to any RAINSTORM compliant instrument that connects to it.

Conclusion

Prototype UMSR and UDCM instruments have been built under a separate project. The user manuals produced under this funding will be supplied with these instruments. The new UDCM auto-ranging functionality is installed on all the latest UDCMs and will be tested by the IAEA. The Apache webserver is also installed on all

new instruments, both UDCM and UMSR. This RAINSTORM compliant functionality will be delivered with the latest prototypes.

Future Work

Future work for both of these instruments may include mulit-faceted testing including static code analysis, dynamic program analysis and environmental testing. This testing would be beneficial in reducing the bugs in the systems that may crop up years in the future. An upgrade to the GUI to improve security and software sustainability could also be performed. Software sustainability as well as a third party audit of the software have also been proposed for future work.